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| | | | EXAMINER | |
| | | | BLOOM, NATHAN J | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2624 | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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|------------------------------|-----------------|-----------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/708,375 | LEE, YUAN-CHUNG | |
| | Examiner | Art Unit | |
| | Nathan Bloom | 2624 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☒ Claim(s) 2, 15, and 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Applicants' response to the last Office Action, filed on August 4th, 2007 has been entered and made of record.

Response to Arguments

1. Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection. This action is Non-Final.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In particular, the independent claims 1, 14, and 20 are ambiguous and thus the claims depending from them also inherit this uncertainty. Claim 1 (also applies to claims 14 and 20) has two parts, part (a) states that the difference is between the two rows of pixels and this is further affirmed in the portion that says the differences "respectively correspond to opposite quadrants". That phrase in combination with "calculating a plurality of first horizontal pixel value differences between pixels positioned in the first row and a plurality of second horizontal pixel value..." makes the description of part (a) more than reasonable interpretable as the difference between opposite pixels in the two rows. However, part (b) seems to point to the differences being between the pixels of the same row. Since part (a) and part (b) of claim 1 (also applies to claims

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14 and 20) contradict each other it becomes indefinite as to what process is actually being claimed. Therefore, in interest of furthering the prosecution of this case an interpretation of the claim language will be chosen (see immediately below) and a search for and application of the prior art will be applied in view of this interpretation.

Interpretation:

The two sets of difference values will be viewed as two sets of opposite quadrant difference values as is consistent with the claim language provided in part (a) of claims 1, 14, and 20. Similarly, the differences between the 3rd and 4th sets will be viewed as two sets of opposite quadrant difference values.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3-5, 10-14, 16-18, and 20-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Jiang (US 6421090).

Instant claim 1: A method for controlling an interpolation direction of a pixel needing to be interpolated between a first row and a second row within an image, the image having a plurality of pixels arranged in a matrix format, the method comprising:

(a) calculating a plurality of first horizontal pixel value differences between pixels positioned in the first row and a plurality of second horizontal pixel value differences between pixels

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positioned in the second row, wherein the first and second horizontal pixel value differences respectively correspond to opposite quadrants of the image with the pixel needing to be interpolated being an origin; and *[Figure 2 shows the two rows used for the spatial interpolation (rows containing pixels A and B) wherein a pixel X to be interpolated is created by directional interpolation determined by the method described in line 56 of column 5 to line 21 of column 6 and line 33 of column 7 to line 20 of column 9. In particular, Jiang discloses in lines 40+ column 7 and lines 14 of column 8 the differencing of pixels that are in opposite quadrants to create 2-3 sets of difference values (can be more than 3, but example given is of 3). Also, as can be seen by Figure 2 the pixel to be interpolated is the center or origin and the pixel differences described are of pixels in opposite quadrants of the two rows.]*

(b) comparing the plurality of first horizontal pixel value differences with a first threshold and the plurality of second horizontal pixel value differences with a second threshold to control whether the interpolation direction is orthogonal to the first row and the second row. *[Jiang teaches in column lines 12 of column 8 to line 20 of column 9 the use of thresholds and the difference values to determine the direction of the interpolation. When three difference sets are used there are 3 possible outcomes vertical, 45 degree, and 135 degree. A first threshold is used to determine the existence of any edge (if not then defaults to vertical interpolation), and then compares the difference values to each other (each difference value is used as a threshold) to determine the directionality of the interpolation as vertical (orthogonal to the rows) or 45/135 degrees (non-orthogonal to the rows). Thus Jiang teaches the comparison of the differences values to at least two threshold values to determine the directionality of the interpolation.]*

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Instant claim 3: The method of claim 1, further comprising: (c) generating the interpolation direction corresponding to the pixel needing to be interpolated according to a directional interpolation process. [*Jiang teaches the directional interpolation of the pixel to be interpolated after the direction has been determined in lines 5-15 of column 9.*]

Instant claim 4: The method of claim 1, wherein the first threshold is equal to the second threshold. [*As can be seen by the various thresholds taught by Jiang (see rejection of claim 1), at least two of these thresholds are equal.*]

Instant claim 5: The method of claim 1, wherein the first row is adjacent to the second row. [*See Figure 2.*]

Instant claim 10: The method of claim 1, wherein step (a) calculates the first horizontal pixel value differences through a repeated use of pixel with other pixels positioned in the first row. [*Jiang teaches the repeated differencing of a pixel with other pixels in the first row. As can be seen in figures 5B-5D pixel B2 is differenced with A0 (Figure 5B), A2 (Figure 5C), and A4 (Figure 5D).*]

Instant claim 11: The method of claim 1, wherein step (a) calculates the second horizontal pixel value differences through a repeated use of pixel with other pixels

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positioned at the second row. *[Jiang teaches the repeated differencing of a pixel with other pixels in the second row. As can be seen in figures 5B-5D pixel A2 is differenced with B4 (Figure 5B), B2 (Figure 5C), and B0 (Figure 5D).]*

Instant claim 12: The method of claim 1, wherein step (a) calculates each of the second horizontal pixel value differences from adjacent pixels. *[See figure 5C and the corresponding disclosure referred to in the rejection of claim 1 wherein the 2nd horizontal pixel value differences are calculated from adjacent pixels between the two rows.]*

Instant claim 13: The method of claim 1, wherein step (a) calculates each of the first horizontal pixel value differences from adjacent pixels, and calculates each of the second horizontal pixel value differences from adjacent pixels. *[See figures 5B and 5C and the corresponding disclosure referred to in the rejection of claim 1 wherein the 1st and 2nd horizontal pixel value differences are calculated from adjacent (adjacent means next to, near, or neighboring) pixels between the two rows.]*

Instant claim 14 describes the device that implements the method of claim 1. *As per rejection of instant claim 1 Jiang discloses the method. Furthermore, Jiang discloses in lines 10-35 of column 10 that the method can be implemented such that a processing unit performs the various functions required by the method.*

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Instant claim 16 describes the device that implements the method of claim 3. *As per rejection of instant claims 3 and 14 Jiang teaches the device of claim 16.*

Instant claim 17: The device of claim 16, wherein the arithmetic unit and/or the processing unit are installed in the directional interpolation unit. *[As per rejection of instant claims 1 and 14 Jiang teaches the device of claim 17. Note: A personal computer has a central processing unit that performs all the necessary functions such as those that are performed by an AU, PU, and DIU. Thus the AU, PU, and DIU are all installed in the same unit (general or central processing unit).]*

Instant claim 18: The device of claim 14, wherein the arithmetic unit and the processing unit are integrated into one module. *[See rejection of claim 17.]*

Instant claim 20: A method for determining an interpolation direction of a designated pixel located between a first row of horizontal pixels and a second row of horizontal pixels within an image, the method comprising:

(a) obtaining first values representing differences between pairs of at least some of the first row of horizontal pixels, and obtaining second values representing differences between pairs of at least some of the second row of horizontal pixels; and *[As per the sections and figures referenced in the rejection of claim 1 Jiang teaches obtaining the differences of at least some of the pixels on the 1st and 2nd rows. The values representing differences described by Jiang are sets (pairs) of difference values.]*

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(b) comparing the first values with a first threshold and the second values with a second threshold to determine whether the interpolation direction is orthogonal to the first row and the second row. *[See rejection of instant claim 1]*

Instant claim 21: The method of claim 20, wherein the first values are obtained by calculating luminance or chrominance values of the first and second rows of horizontal pixels. *[Jiang does not state that either one of or both of the chrominance/luminance values are operated on.*

However, Examiner takes Official Notice that it would have been notoriously obvious to one of ordinary skill in the art that the method taught by Jiang operates on at least one of the chrominance or luminance values, because they are both components of the scan lines that are being interpolated and displayed.]

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6-9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang as applied to claims 1 and 3-5 above, and further in view of Minami (US 2004/0246546).

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Instant claim 6: The method of claim 5, wherein: step (a) further comprises calculating a plurality of third horizontal pixel value differences between pixels positioned in a third row and a plurality of fourth horizontal pixel value differences between pixels positioned in a fourth row, wherein the third and fourth horizontal pixel value differences respectively correspond to opposite quadrants of the image with the pixel needing to be interpolated being the origin; and step (b) further comprises comparing the plurality of third horizontal pixel value differences with a third threshold and the plurality of fourth horizontal pixel value differences with a fourth threshold to control whether the interpolation direction is orthogonal to the first, second, third, and fourth rows. *[As per rejection of instant claims 1 and 5, Jiang teaches the differencing of neighboring pixels and comparing these differences to thresholds, but Jiang does not teach the use of a third and fourth row in the calculations. However, Minami in figures 2-7 and paragraphs 0032-0069 teaches a de-interlacing technique in which 4 consecutive horizontal rows are used in the determination and interpolation of the pixel to be interpolated. Minami in paragraph 0013 reasons that that the use of these extra lines allows for the interpolation to be performed without generating blurred or jagged boundaries at diagonal lines, edges, or discontinuities. Given that both are teaching interpolation methods, it would have been obvious to one of ordinary skill in the art to combine Minami with Jiang to reduce the artifacts described by Minami that are known to occur in methods such as described by Jiang to reduce the interpolation errors in the method described by Jiang.]*

Instant claim 7: The method of claim 6, wherein the first and second rows are positioned between the third and fourth rows. *[See Figure 2-7 of Minami]*

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Instant claim 8: The method of claim 7, wherein the first, second, third, and fourth rows correspond to four successive rows. *[See Figures 2-7 of Minami]*

Instant claim 9: The method of claim 1, wherein: step (a) further comprises calculating a plurality of third horizontal pixel value differences between pixels positioned in a third row and a plurality of fourth horizontal pixel value differences between pixels positioned in a fourth row, wherein the third and fourth horizontal pixel value differences respectively correspond to opposite quadrants of the image with the pixel needing to be interpolated being the origin; and step (b) further comprises comparing the plurality of third horizontal pixel value differences with a third threshold and the plurality of fourth horizontal pixel value differences with a fourth threshold to control whether the interpolation direction is orthogonal to the first, second, third, and fourth rows. *[See rejection of instant claim 6 and Figures 2-7 Minami. Jiang and Minami do not teach the inclusion of the extra thresholds. However, Jiang teaches a series of thresholds wherein there is at least one for each data set (see algorithm pointed to in rejection of claims 2-5), and in order to implement the method of Jiang for the additional rows (additional data sets) it would have been clear to one of ordinary skill in the art that it would have been necessary to perform additional thresholding in the algorithm for the additional data sets.]*

Instant claim 19 describes the device that implements the method of claim 6. *As per the rejection of instant claims 6 and 14 the device has been taught by Jiang in view Minami.*

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Allowable Subject Matter

7. Claims 2, 15, and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Jiang, Minami or the known prior art, do not disclose the thresholding technique taught in these claims.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Bloom whose telephone number is 571-272-9321. The examiner can normally be reached on Monday through Friday from 8:30 am to 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed, can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NB

A handwritten signature in black ink, appearing to read 'SAMIR', followed by a large, sweeping horizontal loop that extends to the right.

SAMIR AHMED
SUPERVISORY PATENT EXAMINER